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UNIVERSITY OF BAHRAIN COLLEGE OF INFORMATION TECHNOLOGY
DEPARTMENT OF COMPUTER SCIENCE FIRST SEMESTER 07/08
ITCS241: Assembly Language Programming First Test Date: NOV 08, 07

QUESTION ONE: Write a complete assembly program that:

[10 pts]

- Defines an array NAS consisting of 32 elements of type double words.
- Randomly generate 32 double words and store the generated values in array NAS.
- Displays in HEX all elements of array NAS as words separated by a space.
- Clear the 2nd and 4th byte in each array element. Keep other bytes in each array element UNCHANGED.
- Display on the screen all double words of array NAS in DECIMAL one value per line.

```
INCLUDE Irvine32.inc
.DATA
NAS      DWORD    32 dup(?)

.CODE
MAIN
PROC
CALL     RANDOMIZE
; Generating random numbers and storing them in array NAS
MOV      ESI, OFFSET NAS
MOV      ECX, LENGTHOF NAS
L0:      CALL     RANDOM32
MOV      [ESI], EAX
ADD      ESI, 4
LOOP     L0
CALL     CRLF
; Display elements of array NAS as words (HEX) separated by space
MOV      ESI, OFFSET NAS
MOV      EBX, TYPE NAS /2
MOV      ECX, 2 * LENGTHOF NAS
CALL     DUMPMEM
CALL     CRLF
; Clearing 2nd and 4th bytes in each double word
MOV      ESI, 0
MOV      ECX, LENGTHOF NAS
L9:      MOV      BYTE PTR NAS[ESI+1], 0
MOV      BYTE PTR NAS[ESI+3], 0
ADD      ESI, 4
LOOP     L9
; Display ARRAY NAS as double words (DEC) ONE VALUE PER LINE
MOV      ECX, LENGTHOF NAS
MOV      ESI, 0
L2:      MOV      EAX, NAS[ESI]
CALL     WRITEDEC
CALL     CRLF
ADD      ESI, 4
LOOP     L2
CALL     CRLF
EXIT
main     ENDP
END      MAIN
```

QUESTION TWO:

{10 points}

Choose the BEST correct answer for each of the following questions and write its letter symbol down in the table shown below

- 1) The 8-bit value 10000001 represents unsigned decimal value ____ and signed decimal value ____
a) -1, 129 b) 129, -127 c) 129, -127 d) 129, -1 e) None
- 2) The number of bytes occupied by: `hh sword 1, 0, 2 dup(3, ?, 4, 3 dup(1, -5), ?, ?)` is:
a) 23 b) 24 c) 46 d) 48 e) None
- 3) The statement that produces syntax error during assembly process is:
a) `ADD AX, BX` b) `SUB EAX, 20H` c) `XCHG AX, BX`
d) `SUB [BX], AX` e) `INC [BX]`
- 4) The register containing the offset address of the next instruction to be executed is:
a) IP b) EDI c) DS d) ESI e) None
- 5) The instruction that stores 0 in the memory word pointed to by esi register is:
a) `MOV esi, 0` b) `MOV [esi], 0` c) `SUB [esi], [esi]`
d) `SUB esi, esi` e) None
- 6) The type of the SOURCE operand used in the instruction: `MOV BX, alpha` is:
a) Immediate b) Direct c) Indexed d) indirect e) None
- 7) If the physical address is 20000 and the offset value is 39C0, then the segment value will be:
a) 59C0 b) 239C0 c) 1C64 d) 1C640 e) None
- 8) The instruction that subtracts the contents of the word pointed to by ebx register from CX register is:
a) `SUB CX, [EBX]` b) `SUB ebx, CX` c) `SUB [ebx], CX`
d) `SUB WORD PTR EBX, CX` e) None
- 9) The instruction the uses immediate operand is:
a) `SUB CX, [2340H]` b) `SUB ebx, type FF` c) `SUB [ebx], CX`
d) `SUB WORD PTR [esi], CX` e) None
- 10) The directive that assigns a string value "ITCS 241" to a constant named TEST is:
a) `TEST byte "ITCS 241"` b) `TEST = "ITCS 241"`
c) `"ITCS 241" EQU TEST` d) `TEST EQU "ITCS 241"` e) None

Question #	1	2	3	4	5	6	7	8	9	10
Answer	B, C	D	E	A	E	B	C	A	B	D

QUESTION THREE:

{10 points}

Given the following data definitions:

```
sword    ?  
F1 sword 200 dup (34CFH)
```

- a) Write a sequence of statements to move the FIRST 100 words of F1 up in the memory for 2 bytes. (Not allowed to change the values in F1).

```
MOV      SI, OFFSET F1  
MOV      CX, 100  
L6: MOV  AX, [ SI ]  
MOV      [ SI - 2 ], AX  
INC      SI  
INC      SI  
LOOP     L6
```

- b) Write a sequence of statements to REVERSE the elements of array F1. (Not allowed to change the values in F1).

```
MOV      SI, OFFSET F1  
MOV      DI, SI + 198      ; SI + sizeof FF -2  
MOV      CX, LENGTHOF F1 / 2 ; # of swaps  
L6: MOV  AX, [SI]  
XCHG     AX, [DI]  
MOV      [SI], AX  
INC      SI  
INC      DI  
DEC      DI  
DEC      SI  
LOOP     L6
```


QUESTION FOUR:

[10 pts]

- (a) Assume that **UU** is a predefined signed memory word and **ME** is a predefined signed double word; Give NO more than **4 instructions** to perform the following: $ME = UU - AX * 2$

```
SUB    UU, AX
SUB    UU, AX
MOVSX  EBX, UU
MOV     ME, EBX
```

- (b) Given: `MOO dword ?`; Give NO more than **3 instructions** to swap the 2 words in `MOO`.

```
MOV     AX, WORD PTR MOO
XCHG    AX, WORD PTR MOO + 2
MOV     WORD PTR MOO, AX
```

- (c) Carefully study the following data definitions and instructions then answer each of the following 4 questions.

```
T1  BYTE    11H, 22H, 7FH, 9AH, 2 dup(?)
T2  WORD    6F7FH, 6ACAH, 81CFH, 69CFH, 12A8H
UT  DWORD   725A9033H, 56F14BH, 69CB3A2CH, 248F7C39H
CCC  EQU    $-T1

MOV     BX, WORD PTR T1
MOV     AX, WORD PTR UT+2
MOV     DX, WORD PTR UT-3
MOV     CH, SIZEOF T2 + 10
MOV     CL, LENGTHOF UT
```

After executing the above instructions,

- 5) The register **AX** will contain: **725AH**.
- 6) The register **DX** will contain: **A8C9H**.
- 7) The register **CX** will contain: **1404H**.
- 8) Give ONE instruction to store in **DI** register the 3rd word of array **T2**: `MOV DI, T2` [4]